CheapNursingCEUs.com

Anemia

Introduction

Anemia is the most common blood disorder. According to research presented by the National Heart, Lung, and Blood Institute (NHLBI), anemia affects approximately three million Americans nationwide, and cases of anemia may be on the rise. As a result of the growing patient population suffering from anemia, health care professionals should be familiar with anemia. With that in mind, this course will review anemia concepts central to patient care, specific types of anemia, as well as anemia prevention and treatment methods in order to build awareness among health care professionals so they may work to safely and effectively treat the growing patient population suffering from anemia.

Section 1: Anemia

Due to a host of different factors, including the growing older adult patient population, cases of anemia are on the rise. Health care professionals should be familiar with anemia concepts central to patient care in order to work towards optimizing anemia care. This section of the course will review anemia concepts central to patient care, such as: causes, risk factors, signs/symptoms, the diagnostic procedure, patient populations most vulnerable to anemia, and associated compilcations. The information found in this section of the course was derived from materials provided by the National Heart, Lung, and Blood Institute (NHLBI) unless, otherwise, specified (National Heart, Lung, and Blood Institute [NHLBI], 2022).

What is anemia?

Anemia may refer to a condition that develops when the blood produces a lower-than-normal amount of healthy red blood cells.

Health care professionals should note the following: red blood cells may refer to cells that are made in the bone marrow and found in the blood, which contain a protein called hemoglobin; hemoglobin may refer to a protein in red blood cells that carries oxygen.

What causes anemia?

Anemia typically develops through three main mechanisms: ineffective erythropoiesis (when the body makes too few red blood cells), haemolysis (when red blood cells are destroyed) and blood loss.

What are the risk factors for anemia?

- **Blood loss** - one of the first risk factors for anemia that may initially come to mind is blood loss. Bleeding can cause a sudden reduction in red blood cells, and, subsequently, anemia. Health care professionals should note the following: bleeding or excessive bleeding may lead to acute anemia; acute anemia may refer to a condition that occurs when there is an abrupt drop in red blood cells.
- **Diet** - diet is another risk factor for anemia that may initially come to mind. Diets low in iron, vitamin B12, and folic acid may lead to anemia. Health care professionals should note the following: diet-related anemia typically results when the intake of certain nutrients is insufficient to meet the demands for synthesis of red blood cells and hemoglobin; iron deficiency is the most common cause of anemia.
- **Age** - individuals over the age of 50 are at increased risk for developing anemia.
- **Pregnancy** - due to the increased need for blood, some individuals may develop anemia during pregnancy. Health care professionals should note the following factors that may increase the risk of anemia during pregnancy: vomiting, a low-nutrient diet, multiple pregnancy, two pregnancies close together, and blood loss (note: the term multiple pregnancy may refer to a pregnancy involving more than one baby at one time).
- **Medical conditions** - the following medical conditions may increase the risk of developing anemia: Crohn's disease, celiac disease, kidney disease, rheumatoid arthritis, and cancer.
- **Infectious diseases** - infectious diseases (e.g., malaria) may lead to anemia through impaired nutrient absorption and metabolism, ineffective erythropoiesis, or increased nutrient losses. Health care professionals should note that erythropoiesis may refer to the process that produces red blood cells.

- **Coronavirus disease 2019 (COVID-19)** - to build on the previous risk factor, COVID-19 is frequently associated with anemia. Health care professionals should note the following: COVID-19 may refer to a respiratory illness that can spread from person to person, which is caused by a virus known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).
- **Chemotherapy** - chemotherapy can damage red blood cells and/or bone marrow, which, in turn, may lead to anemia.
- **Growth spurts** - children younger than three years of age may develop anemia due to rapid growth.
- **Genetic factors** - genetic factors (e.g., inherited hemoglobin disorders, such as sickle cell disease) may lead to anemia. Health care professionals should note that sickle cell disease may refer to an inherited blood disorder characterized by defective hemoglobin.

What are the signs/symptoms of anemia?

The signs/symptoms of anemia include the following:

- Weakness
- Paleness
- Brittle nails
- Fatigue
- Chills
- Cold hands and feet
- Shortness of breath
- Irregular heartbeat
- Chest pain
- Headaches
- Dizziness and fainting

- Bleeding
- Jaundice (note: jaundice may refer to a condition characterized by yellowish skin and/or yellowish whites of the eyes caused by the buildup of bilirubin in the blood)

How is anemia diagnosed?

- Anemia is typically diagnosed by health care professionals based on the results of a physical exam and blood tests (e.g., red blood cell levels; hemoglobin levels; hematocrit levels).
- Red blood cell levels that are higher or lower than normal may be a sign of anemia. The normal range of red blood cell levels for adult men is 5 to 6 million cells/mcL; the normal range of red blood cell levels for adult women is 4 to 5 million cells/mcL.
- Hemoglobin levels that are higher or lower than normal may be a sign of anemia. The normal hemoglobin range results for adult men is 14 to 17 gm/dL; the normal hemoglobin range results for adult women is 12 to 15 gm/dL.
- Hematocrit levels that are too low may be a sign of anemia. The normal hematocrit range results for adult men is 41% to 50%; the normal hematocrit range results for adult women is 36% to 44%.

What are the patient populations most vulnerable to anemia?

The patient populations most vulnerable to anemia include: infants and children under the age of two; children under the age of five; adolescents; pregnant individuals; and older adults (note: the term older adult may refer to an individual 65 years or older). Specific information regarding the aforementioned patient populations groups may be found below. The information found below was derived from materials provided by the World Health Organization (WHO) (World Health Organization [WHO], 2017).

- **Infants and children under the age of two** - anemia can be common in infants and young children under the age of two, due to the high iron requirements needed for their rapid growth and development, particularly during the first two years of life. Health care professionals should note that a preterm birth may increase the risk of anemia for some infants (note: a preterm birth may refer to

the birth of a live baby that is born before 37 weeks of pregnancy have been completed).

- **Children under the age of five** - children under the age of five may be vulnerable to anemia due to growth spurts, and iron-low diets.
- **Adolescents** - adolescents may be vulnerable to anemia due to periods of high growth and development during adolescence; iron-low diets; and regular blood loss that occurs with menstruation.
- **Pregnant individuals** - as previously mentioned, pregnant individuals may be vulnerable to anemia due to the increased need for blood during pregnancy. Health care professionals should note the following: pregnant adolescents are at increased risk of developing anemia due to increased iron requirements.
- **Older adults** - the risk for developing anemia increases with age, starting at the age of 50 years. Thus, older adults are vulnerable to anemia. Health care professionals should note the following: approximately one third of anemia cases in older adults in the U.S. are due to nutritional deficiencies, primarily iron, folate, and vitamin B12; one third are due to chronic inflammation or chronic kidney disease; and one third are considered “unexplained anemia of older adults."

What are the compilcations typically associated with anemia?

- **Decreased work productively and physical activity** - anemia can lead to weakness, fatigue, and shortness of breath, all of which can lead to decreased work productively and decreased physical activity (note: physical activity may refer to any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level).
- **Weight gain/obesity** - due to decreased physical activity, anemia may be associated with weight gain and obesity. Health care professional should note the following: obesity may refer to a condition characterized by abnormal or excessive fat accumulation, which may impair health; an individual may be considered to be obese when his or her body mass index (BMI) is greater than or equal to 30 kg/m^2; body mass index (BMI) may refer to a value derived from an individual's height and weight.

- **Impaired muscle strength** - anemia can lead to impaired muscle strength. Health care professionals should note that older adults are especially vulnerable to anemia-associated impaired muscle strength.

- **Decreased mobility** - due to impaired muscle strength, individuals suffering from anemia may experience decreased mobility. Decreased mobility may refer to a state in which an individual has a limitation in independent, purposeful physical movement. Health care professionals should note the following signs/symptoms of decreased mobility: inability to intentionally move; inability to perform activity as instructed; limited range of motion (ROM); hesitance to attempt movement due to pain or fear of pain.

- **Falls** - due to impaired muscle strength and decreased mobility, individuals suffering from anemia may experience falls. The term fall may refer to an event which results in an individual coming to rest on the ground or a lower level. Health care professionals should note the following: falling once doubles older adults' chances of falling again; one out of five falls causes a serious injury such as broken bones or a head injury; falls may lead to falling-related fear; falling-related fear may cause an individual to cut down on his or her everyday activities; when an individual is less active, he or she may become weaker, which increases his or her risk of falling. Health care professionals should also note the following strategies to prevent falls: review medications to determine if one or more medications may lead to dizziness, lightheadedness, and/or sedation; exercise; vision checks; remove hazards; install railings on both sides of stairs; install grab bars inside and outside of the tub or shower and next to the toilet; improve lighting, when applicable; use non-slip mats in the bathtub and on shower floors.

- **Dementia** - anemia is associated with dementia in older adults. Dementia may refer to a cluster of symptoms centered around an inability to remember, think clearly, and/or make decisions. Health care professionals should note the following: dementia can dramatically impact older adults' ability to function and carry out daily activities; older adults suffering from dementia commonly experience impairments in occupational and social functioning and may present behavioral disturbances; dementia is not a normal part of aging. Health care professionals should also note the following signs and symptoms of dementia: getting lost in a familiar area; forgetting the names of close family and friends; not being able to complete tasks independently; problems with memory; problems

with attention; an inability to communicate effectively; a diminished ability to reason and problem solve; poor judgment.

- **Poor birth outcomes** - anemia may lead to poor birth outcomes, such as: low-birth weight, preterm birth, and, subsequently, developmental disabilities. Specific information regarding developmental disabilities may be found below. The information found below was derived from materials provided by the Centers for Disease Control and Prevention (CDC) (Centers for Disease Control and Prevention [CDC], 2022).

    - Developmental disabilities may refer to a group of conditions characterized by impairment in physical, learning, language, or behavior areas. Examples of developmental disabilities include autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD).

    - ASD may refer to a complex developmental disorder that affects how an individual behaves, interacts with others, communicates, and learns.

    - ASD typically affects the structure and function of the brain and nervous system (note: ASD lasts the course of an individual's life).

    - Autism is referred to as a spectrum disorder because there is wide variation in the type and severity of ASD symptoms. Health care professionals should note that the major symptoms of ASD fall into the following categories: social skill symptoms, communication symptoms, unusual behavior symptoms, and "other" symptoms.

    - The social skill symptoms associated with ASD include the following: an individual does not respond to his or her name by 12 months of age; an individual does not point out interesting objects by 14 months of age; an individual appears to be very independent for his or her age; an individual often appears to be in his or her "own world;" an individual often appears to "tune out" other individuals; an individual avoids eye-contact; an individual prefers to play alone; an individual does not share interests with others; an individual only interacts with others to achieve a desired goal or outcome; an individual displays flat or inappropriate facial expressions; an individual does not understand personal space boundaries; an individual avoids or resists physical contact; an individual has trouble understanding other individual's feelings or talking about his or her own feelings.

- The communication symptoms associated with ASD include the following: an individual exhibits delayed speech and language skills; an individual appears to hear sometimes, but not other times; an individual exhibits echolalia (note: the term echolalia may refer to reparative speech patterns; respective word use); an individual often reverses pronouns (e.g., says “you” instead of “I” when engaged in a conversation and/or discussion); an individual uses language in unusual ways; an individual may lack the capacity to put words into sentences; an individual often cannot fully articulate what he or she wants; an individual gives unrelated answers to questions; does not point or respond to pointing; uses few or no gestures (e.g., does not wave hello or goodbye); talks in a flat, robot-like, or sing-song voice; does not pretend in play (e.g., does not engage with toys); does not understand jokes, sarcasm, and/or teasing.

- The unusual behavior symptoms associated with ASD include the following: an individual may line up his or her toys or other objects in a specific way; an individual spends a lot of time lining things up or putting things in a specific order; an individual may play with his or her toys the same way every time; an individual may appear to like parts of objects (e.g., wheels, book covers, picture frames); very organized; often gets upset by minor changes; has obsessive interests; has to follow certain routines.

- The "other" symptoms associated with ASD include the following: an individual may appear to stare at nothing or wander around; an individual may prefer to walk on his or her toes; an individual appears to be oversensitive to noise; an individual may appear overly uncooperative and/or overly resistant; does not like to climb things, such as stairs; hyperactivity (i.e., very active); impulsivity (e.g., acting without thinking); short attention span; aggression; causes self injury; often displays a lack of self control (i.e., often has "meltdowns" or tantrums); displays unusual sleeping habits; often displays unusual moods or emotional reactions; lack of fear or more fear than expected; unusual reactions to the way things sound, smell, taste, look, or feel; displays unusual eating habits, such as pica (note: pica may refer to an eating disorder characterized by the need to eat objects with little to no nutritional value, such as: ice, grass, dirt, rocks, hair, and/or paper).

- ASD is typically diagnosed by a physician using criteria outlined in the Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).
- The physical and mental-health conditions typically associated with ASD include the following: epilepsy, ADHD, anxiety, depression, bipolar disorders, and avoidant/restrictive food intake disorder.
- Treatment for ASD may include one or more of the following treatment options: medications, nutrition, physical activity, physical therapy, psychotherapy, cognitive behavioral therapy, social skills training, joint attention therapy, and support groups.
- ADHD may refer to a type of brain disorder that is marked by an ongoing pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development.
- ADHD-related inattention may refer to an inability to maintain focus. Individuals exhibiting ADHD-related inattention typically appear disorganized, lack persistence, wander off task, and typically have difficulty maintaining sustained focus.
- ADHD-related hyperactivity may refer to a type or form of restlessness. Individuals exhibiting ADHD-related hyperactivity may appear fidgety or constantly move around. Individuals exhibiting ADHD-related hyperactivity may also talk excessively and/or maintain constant activity (e.g., rapidly move from one activity to the next).
- ADHD-related impulsivity may refer to a form of behavior that is characterized by ill-conceived actions. Individuals exhibiting ADHD-related impulsivity typically do not consider the long-term consequences of their actions. Often individuals exhibiting ADHD-related impulsivity engage in risky activities, which are not well thought out and/or planned. Individuals exhibiting ADHD-related impulsivity may also take part in activities that offer instant gratification. Additionally, individuals exhibiting ADHD-related impulsivity may appear socially intrusive or excessively invasive.
- Inattentive-related symptoms of ADHD may include the following: an inability to give close attention to details; an inability to maintain focus; an inability to maintain sustained mental effort for long periods of time; a capacity to consistently overlook details; a capacity to consistently make

mistakes (e.g., making careless mistakes on a consistent basis); often appears to be not listening when being spoken to directly; often fails to follow through on instructions; often fails to complete tasks; often distracted by extraneous stimuli; often forgetful; consistently disorganized.

- Hyperactivity-impulsive symptoms of ADHD may include the following: fidgety (e.g., hand tapping, foot tapping, squirms in his or her seat); often moves around and/or makes movements at seemingly inappropriate times; restless; excessive talking; often interrupts other individuals while they are talking; often exhibits difficulty waiting for his or her turn; often intrudes on others.
- ADHD is typically diagnosed by a physician using criteria outlined in the DSM-5.
- Complications typically associated with ADHD include: academic/work-related failure, low self-esteem, and social isolation.
- Conditions typically associated with ADHD can include the following: oppositional defiant disorder, disruptive mood dysregulation disorder, autism spectrum disorder, Tourette's syndrome, sleep disorders, anxiety disorders, and substance abuse.
- Treatment for ADHD may include one or more of the following treatment options: medications, psychotherapy, cognitive behavioral therapy, social skills training, support groups, routine exercise, and developing sleep routines.

- **Increased risk for postpartum depression** - anemia is associated with an increased risk for postpartum depression. Specific information regarding postpartum depression may be found below. The information found below was derived from materials provided by the CDC (CDC, 2022).
    - Postpartum depression may refer to a form or type of depression suffered by a mother following childbirth, typically arising from the combination of the following factors: hormonal changes, psychological adjustment to motherhood, and fatigue.
    - Signs/symptoms of postpartum depression may include the following: feeling sad, hopeless, empty, or overwhelmed; crying more often than usual or for no apparent reason; worrying or feeling overly anxious; feeling

moody, irritable, or restless; oversleeping; having trouble concentrating; having trouble remembering details; having trouble making decisions; experiencing anger or rage; losing interest in activities that are usually enjoyable; suffering from physical aches and pains; muscle pain; frequent headaches; stomach problems; eating too little or too much; withdrawing from or avoiding friends and family; having trouble bonding or forming an emotional attachment with an infant; thinking about self-harming; thinking about harming an infant.

- If a new mother experiences the aforementioned symptoms for a period of two weeks or more, the new mother should seek the care of a health care professional.
- Postpartum depression should be diagnosed by a health care professional.
- If left untreated postpartum depression may lead to the following: additional health problems, an inability to care for an infant, and/or self-harm/infant harm.
- Nonpharmacological treatment options for postpartum depression include: psychotherapy, cognitive behavioral therapy, and support groups.
- Pharmacological treatment options for postpartum depression include selective serotonin reuptake inhibitors (SSRIs).

Section 1 Summary

Anemia may refer to a condition that develops when the blood produces a lower-than-normal amount of healthy red blood cells. If left undiagnosed, anemia can dramatically impact the lives of those affected by the condition. Health care professionals should work to identify individuals potentially suffering from anemia.

Section 1 Key Concepts

- Anemia typically develops through three main mechanisms: ineffective erythropoiesis (when the body makes too few red blood cells), haemolysis (when red blood cells are destroyed) and blood loss.
- Specific patient populations may be especially vulnerable to anemia.

- Anemia is associated with complications that can affect the health, overall well-being, and quality of life of those suffering from anemia.

Section 1 Key Terms

Anemia - a condition that develops when the blood produces a lower-than-normal amount of healthy red blood cells

Red blood cells - cells that are made in the bone marrow and found in the blood, which contain a protein called hemoglobin

Hemoglobin - a protein in red blood cells that carries oxygen

Acute anemia - a condition that occurs when there is an abrupt drop in red blood cells

Multiple pregnancy - a pregnancy involving more than one baby at one time

Erythropoiesis - the process that produces red blood cells

Coronavirus disease 2019 (COVID-19) - a respiratory illness that can spread from person to person, which is caused by a virus known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

Sickle cell disease - an inherited blood disorder characterized by defective hemoglobin

Jaundice - a condition characterized by yellowish skin and/or yellowish whites of the eyes caused by the buildup of bilirubin in the blood

Older adult - an individual 65 years or older

Preterm birth - the birth of a live baby that is born before 37 weeks of pregnancy have been completed

Physical activity - any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level

Obesity - a condition characterized by abnormal or excessive fat accumulation, which may impair health

Body mass index (BMI) - a value derived from an individual's height and weight

Decreased mobility - a state in which an individual has a limitation in independent, purposeful physical movement

Fall - an event which results in an individual coming to rest on the ground or a lower level

Dementia - a cluster of symptoms centered around an inability to remember, think clearly, and/or make decisions

Developmental disabilities - a group of conditions characterized by impairment in physical, learning, language, or behavior areas

Autism spectrum disorder (ASD) - a complex developmental disorder that affects how an individual behaves, interacts with others, communicates, and learns

Echolalia - repetitive speech patterns; respective word use

Pica - an eating disorder characterized by the need to eat objects with little to no nutritional value, such as: ice, grass, dirt, rocks, hair, and/or paper

Attention-deficit/hyperactivity disorder (ADHD) - a type of brain disorder that is marked by an ongoing pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development

ADHD-related inattention - an inability to maintain focus

ADHD-related hyperactivity - a type or form of restlessness

ADHD-related impulsivity - a form of behavior that is characterized by ill-conceived actions

Postpartum depression - a form or type of depression suffered by a mother following childbirth, typically arising from the combination of the following factors: hormonal changes, psychological adjustment to motherhood, and fatigue

Section 1 Personal Reflection Question

How may an individual potentially suffering from anemia present to a health care facility?

Section 2: Types of Anemia

There are different types of anemia. Some of the most common types of anemia include: iron-deficiency anemia, vitamin B12-deficiency anemia, hemolytic anemia, and aplastic

anemia. This section of the course will review the aforementioned types of anemia, while highlighting prevention and treatment options for each, specific, type of anemia. The information found within this section of the course was derived from materials provided by the NHLBI unless, otherwise, specified (NHLBI, 2022).

Iron-Deficiency Anemia

- Iron-deficiency anemia may refer to a type of anemia that develops when there is not a sufficient amount of iron in the body.
- Iron-deficiency anemia is the most common type of anemia.
- The signs and symptoms of iron-deficiency anemia include: fatigue, dizziness, lightheadedness, cold hands and feet, pale skin, shortness of breath, and chest pain.
- Iron-deficiency anemia is preventable. Individuals may prevent iron-deficiency anemia through an iron-rich diet that includes the following iron-rich foods: beans, dried fruits, eggs, lean red meat, salmon, iron-fortified breads and cereals, peas, tofu, and dark green leafy vegetables. Health care professionals should note that the recommended daily amounts of iron depend on age, sex, and whether an individual is pregnant or breastfeeding. Specific iron reconditions may be below.
    - Male and female individuals younger than six months of age should take in 0.27 mg of iron per day.
    - Male and female individuals between the ages of 7 - 12 months should take in 11 mg of iron per day.
    - Male and female individuals between the ages of 1 - 3 years old should take in 7 mg of iron per day.
    - Male and female individuals between the ages of 4 - 8 years old should take in 10 mg of iron per day.
    - Male and female individuals between the ages of 9 - 13 years old should take in 8 mg of iron per day.
    - Male individuals between the ages of 14 - 18 years old should take in 11 mg of iron per day.

    - Female individuals between the ages of 14 - 18 years old should take in 15 mg of iron per day.
    - Pregnant female individuals between the ages of 14 - 18 years old should take in 27 mg of iron per day.
    - Breastfeeding female individuals between the ages of 14 - 18 years old should take in 10 mg of iron per day.
    - Male individuals between the ages of 19 - 50 years old should take in 8 mg of iron per day.
    - Female individuals between the ages of 19 - 50 years old should take in 18 mg of iron per day.
    - Pregnant female individuals between the ages of 19 - 50 years old should take in 27 mg of iron per day.
    - Breastfeeding female individuals between the ages of 19 - 50 years old should take in 9 mg of iron per day.
    - Male and female individuals 51 years old and older should take in 8 mg of iron per day.
- Iron-deficiency anemia is treatable. Specific treatment options for iron-deficiency anemia may be found below (note: untreated iron-deficiency anemia may cause serious complications such as fatigue, headaches, restless legs syndrome, heart problems, pregnancy complications, and developmental delays in children; untreated iron-deficiency anemia can also impact chronic health conditions, such as hypertension).
    - Iron supplements - iron supplements are the most common treatment option for iron-deficiency anemia. Iron supplements often take three to six months to restore iron levels. Health care professionals should note the following: ferrous sulfate is an example of an iron supplement; individuals may require iron supplements during pregnancy.
    - Intravenous (IV) iron - IV iron helps increase iron levels in the blood. It often takes only one or a few sessions to restore iron levels. Individuals who have serious iron-deficiency anemia or who have long-term conditions are more likely to receive IV iron. Venofer is an example of IV

iron. Health care professionals should note the following information: Venofer is an iron replacement product indicated for the treatment of iron deficiency anemia in patients with chronic kidney disease; Venofer is contraindicated in individuals with a known hypersensitivity to Venofer; the most common Venofer adverse reactions include: diarrhea, nausea, vomiting, headache, dizziness, hypotension, pruritus, pain in extremities, arthralgia, back pain, muscle cramps, injection site reactions, chest pain, and peripheral edema.

- Erythropoiesis-stimulating agents - erythropoiesis-stimulating agents may refer to a class of medications that stimulate the bone marrow to make red blood cells. Erythropoiesis-stimulating agents are used to treat anemia due to end stage kidney disease, chemotherapy, major surgery, or certain treatments in HIV/AIDS. Epogen is an example of a erythropoiesis-stimulating agent. Health care professionals should note the following Epogen boxed warnings: in controlled trials, patients experienced greater risks for death, serious adverse cardiovascular reactions, and stroke when administered erythropoiesis-stimulating agents to target a hemoglobin level of greater than 11 g/dL (5.1); no trial identified a hemoglobin target level, erythropoiesis-stimulating agents dose, or dosing strategy that does not increase these risks; use the lowest Epogen dose sufficient to reduce the need for red blood cell transfusions; erythropoiesis-stimulating agents shortened overall survival and/or increased the risk of tumor progression or recurrence in clinical studies of patients with breast, non-small cell lung, head and neck, lymphoid, and cervical cancers; use the lowest dose to avoid red blood cell transfusions; use erythropoiesis-stimulating agents only for anemia from myelosuppressive chemotherapy; erythropoiesis-stimulating agents are not indicated for patients receiving myelosuppressive chemotherapy when the anticipated outcome is cure; discontinue following the completion of a chemotherapy course; due to increased risk of deep venous thrombosis (DVT), DVT prophylaxis is recommended.

- Blood transfusions and surgery - blood transfusions may be used to quickly increase the amount of red blood cells and iron in the blood, while surgery may be used to stop internal bleeding.

Vitamin B12-Deficiency Anemia

- Vitamin B12-deficiency anemia, also known as cobalamin deficiency, may refer to a condition that develops when the body cannot make enough healthy red blood cells because it doesn't have enough vitamin B12.
- The body requires B12 to produce healthy red blood cells, white blood cells, and platelets.
- Without enough vitamin B12, blood cells do not form properly inside bone marrow.
- Individuals can become vitamin B12 deficient if they cannot absorb vitamin B12 due to problems with the gut.
- The signs and symptoms of vitamin B12-deficiency anemia include: fatigue, paleness, shortness of breath, headaches, dizziness, tingling feelings or pain, trouble walking, uncontrollable muscle movements, confusion, slower thinking, forgetfulness, memory loss, mood or mental changes (e.g., depression; irritability), problems with smell or taste, vision problems, diarrhea, weight loss, and glossitis (note: glossitis may refer to a condition characterized by an inflamed, painful, smooth, red tongue).
- Vitamin B12-deficiency anemia is preventable. Individuals may prevent vitamin B12-deficiency anemia through a B12-rich diet that includes the following B12-rich foods: lean red meat, chicken, fish (e.g., catfish; salmon), milk, yogurt, cheese, fortified vegan milk substitutes, fortified cereals, and eggs. Health care professionals should note that the recommended daily amounts of B12 depend on age, sex, and whether an individual is pregnant or breastfeeding. Specific B12 reconditions may be found below.
    - Male and female individuals between the ages of 1 - 3 years old should take in 0.9 mcg of B12 per day.
    - Male and female individuals between the ages of 4 - 8 years old should take in 1.2 mcg of B12 per day.
    - Male and female individuals between the ages of 9 - 13 years old should take in 1.8 mcg of B12 per day.

    - Male and female individuals between the ages of 14 - 18 years old should take in 2.4 mcg of B12 per day.
    - Pregnant individuals between the ages of 14 - 18 years old should take in 2.6 mcg of B12 per day.
    - Breastfeeding individuals between the ages of 14 - 18 years old should take in 2.8 mcg of B12 per day.
    - Male and female individuals between the ages of 19 - 50 years old should take in 2.4 mcg of B12 per day.
    - Pregnant individuals between the ages of 19 - 50 years old should take in 2.6 mcg of B12 per day.
    - Breastfeeding individuals between the ages of 19 - 50 years old should take in 2.8 mcg of B12 per day.
    - Male and female individuals 51 years old and older should take in 2.4 mcg of B12 per day.
- Vitamin B12-deficiency anemia is treatable. Specific treatment options for vitamin B12-deficiency anemia may be found below (note: untreated vitamin B12-deficiency anemia/vitamin B12-deficiency may lead to serious complications, such as: bleeding, infections, and problems with the brain or nerves that may be permanent; babies born to mothers who suffer from vitamin B12-deficiency may have developmental delays and birth defects of the brain and spinal cord).
    - B12 supplements - B12 supplements may be used to help increase the levels of vitamin B12 in the body.
    - Blood transfusions - blood transfusions may be used to treat serious vitamin B12-deficiency anemia in combination with vitamin B12 treatment.

Hemolytic Anemia

- Hemolytic anemia may refer to a blood condition that occurs when red blood cells are destroyed faster than they can be replaced.
- Hemolytic anemia can develop quickly or slowly, and it may be mild or serious.

- The signs and symptoms of hemolytic anemia include: fatigue, dizziness, weakness, an enlarged spleen, and an enlarged liver.
- Inherited types of hemolytic anemia cannot be prevented.
- Hemolytic anemia is treatable. Specific treatment options for hemolytic anemia may be found below (note: untreated hemolytic anemia may lead to heart failure).
    - Blood transfusions - blood transfusions may be used to help increase the number of available red blood cells to carry oxygen to the body tissues.
    - Corticosteroids - corticosteroids such as prednisone may be used to suppress an overactive immune system, which may limit the destruction of the red blood cells. Health care professionals should note the following adverse effects of corticosteroids: weight gain, high blood pressure, acne, upset stomach, and irritability.
    - Immune globulin (IVIG) - immune globulin (IVIG) is a product administered via intravenous infusion that decreases the destruction of red blood cells. IVIG is often used to treat autoimmune hemolytic anemia. Health care professionals should note the following adverse effects of IVIG: fever, chills, headache, light-headedness, flushing, itching, and blood pressure changes.
    - Immunosuppressive therapy - immunosuppressive therapy may be used to suppress the immune system, which may help prevent red blood cells from being destroyed by an individual's own immune system (autoimmune hemolytic anemia). Health care professionals should note that immunosuppressive therapy may be reserved for patients who do not respond well to other treatment options.
    - Splenectomy - a splenectomy may refer to a surgical procedure that partially or completely removes the spleen. The spleen may be the location of red blood cell destruction in patients suffering from hemolytic anemia. Thus, a splenectomy may be used to prevent the destruction of red blood cells. Health care professionals should note that a splenectomy may be reserved for patients who do not respond well to other treatment options.

Aplastic Anemia

- Aplastic anemia may refer to a blood condition that occurs when the bone marrow cannot make enough new blood cells for the body to function in a normal capacity.
- The most common cause of aplastic anemia is the immune system attacking the stem cells in the bone marrow; radiation and chemotherapy treatments may also lead to aplastic anemia.
- The signs and symptoms of aplastic anemia include: fatigue, infections that last longer than normal, and easy bruising and/or bleeding.
- Most cases of aplastic anemia cannot be prevented.
- Aplastic anemia is treatable. Specific treatment options for aplastic anemia may be found below (note: untreated aplastic anemia may lead to heart failure).
    - Blood transfusions - blood transfusions may be used to help increase the number of available red blood cells to carry oxygen to the body tissues.
    - Bone marrow stimulants - bone marrow stimulants may be used to stimulate the bone marrow to produce blood cells. Filgrastim is an example of a bone marrow stimulant. Health care professionals should note the following warnings and precautions associated with filgrastim: discontinue filgrastim
      in patients with serious allergic reactions; evaluate patients who report left upper abdominal or shoulder pain or an enlarged spleen or splenic rupture; evaluate patients who develop fever and lung infiltrates or respiratory distress or acute respiratory distress syndrome (ARDS); discontinue filgrastim in patients with ARD; fatal sickle cell crises have occurred.
    - Supportive antibiotics - supportive antibiotics may be used to treat related infections.
    - Immunosuppressive therapy - immunosuppressive therapy may be used to suppress the immune system, which may help prevent red blood cells from being destroyed by an individual's own immune system (autoimmune hemolytic anemia). Health care professionals should note that

immunosuppressive therapy may be reserved for patients who do not respond well to other treatment options.

- Bone marrow transplant - a bone marrow transplant, also referred to as a stem cell transplant, is the only cure for aplastic anemia. Bone marrow transplants replace damaged stem cells with healthy ones. Health care professionals should note the following: a successful bone marrow transplant requires a good donor match; a good donor match is an individual with the same blood type or similar genetic makeup; for most individuals, the best donor match is a close relative, such as a sibling or parent.

Section 2 Summary

Some of the most common types of anemia include: iron-deficiency anemia, vitamin B12-deficiency anemia, hemolytic anemia, and aplastic anemia. Health care professionals should work to identify, prevent, and treat patients suffering from the aforementioned types of anemia.

Section 2 Key Concepts

- Some types of anemia can be prevented.
- Individuals suffering from specific types of anemia may be treated with supplements, medications, blood transfusions, and/or surgery.

Section 2 Key Terms

Iron-deficiency anemia - a type of anemia that develops when there is not a sufficient amount of iron in the body

Erythropoiesis-stimulating agents - a class of medications that stimulate the bone marrow to make red blood cells

Vitamin B12-deficiency anemia (also known as cobalamin deficiency) - a condition that develops when the body cannot make enough healthy red blood cells because it doesn't have enough vitamin B12

Glossitis - a condition characterized by an inflamed, painful, smooth, red tongue

Hemolytic anemia - a blood condition that occurs when red blood cells are destroyed faster than they can be replaced

Splenectomy - a surgical procedure that partially or completely removes the spleen

Aplastic anemia - a blood condition that occurs when the bone marrow cannot make enough new blood cells for the body to function in a normal capacity

Section 2 Personal Reflection Question

How can insight into the types of anemia presented above help health care professionals optimize patient care?

Conclusion

Anemia is the most common blood disorder, and due to a host of different factors, including the growing older adult patient population, cases of anemia are on the rise. Therefore, health care professionals should be familiar with anemia concepts central to patient care, the specific types of anemia, and methods to prevent and treat specific types of anemia. Finally, health care professionals should work to identify patients suffering from anemia in order to ensure patients receive the care they require.

References

Centers for Disease Control and Prevention. (2022, April 29). Depression during and after pregnancy. https://www.cdc.gov/reproductivehealth/features/maternal-depression/index.html

Centers for Disease Control and Prevention. (2022, April 29). *Developmental disabilities*. https://www.cdc.gov/ncbddd/developmentaldisabilities/index.html

National Heart, Lung, and Blood Institute. (2022, March 24). *Aplastic anemia*. https://www.nhlbi.nih.gov/health/anemia/aplastic-anemia

National Heart, Lung, and Blood Institute. (2022, March 24). *Hemolytic anemia*. https://www.nhlbi.nih.gov/health/anemia/hemolytic-anemia

National Heart, Lung, and Blood Institute. (2022, March 24). *Iron-deficiency anemia*. https://www.nhlbi.nih.gov/health/anemia/iron-deficiency-anemia

National Heart, Lung, and Blood Institute. (2022, March 24). *Vitamin B12- deficiency anemia*. https://www.nhlbi.nih.gov/health/anemia/vitamin-b12-deficiency-anemia

National Heart, Lung, and Blood Institute. (2022, March 24). *What is anemia*. https://www.nhlbi.nih.gov/health/anemia

World Health Organization. (2017). *Nutritional anemias: Tools for effective prevention and control*. https://apps.who.int/iris/rest/bitstreams/1091289/retrieve